

## A new species of gall-forming coccoid (Insecta: Homoptera: Eriococcidae) from Western Australia

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### Abstract

The adult female, the galls of the adult female and the adult male, and the first instar nymph of *Apiomorpha pomaphora* sp. nov. are described and illustrated. The species is found on mallee eucalypts in the Irwin Botanical District of Western Australia.

### Introduction

The gall-forming coccoid genus *Apiomorpha* Rübsaamen (Homoptera: Eriococcidae) has been revised by Gullan (1984a) who records 13, or possibly 14, species from Western Australia. All occur in south-west Western Australia south of 30°S except for *A. cucurbita* Fuller which has been recorded only from the Kimberley region. This paper describes a new species of *Apiomorpha*, *A. pomaphora*, which forms galls on two species of mallee eucalypts near Watheroo, Eneabba and Kalbarri in the Irwin Botanical District (Beard 1980) which encompasses the western part of the Bencubbin Botanical Region (Barlow 1985). This is the first record of an *Apiomorpha* species from this area of Western Australia.

*Apiomorpha pomaphora* belongs to the *malleecola* species-group (Gullan 1984a) which contains only one species, *A. malleecola* Gullan, from mallee eucalypts in north-west Victoria, south-west South Australia, south-central Northern Territory and south-west Western Australia.

This paper describes and illustrates the adult female, the first instar nymph and the galls of the adult female and adult male of *A. pomaphora*.

### Methods

The preservation, slide-mounting, mensural and illustrative methods of Gullan (1984a) were employed. The morphological terminology of Gullan (1984a) and Williams (1985b) was used for the descriptions, however, the system for numbering abdominal segments requires clarification. If the body segments of *Apiomorpha* are numbered according to the accepted convention of placing the vulva between the seventh and eighth abdominal segments (Miller 1984; Williams 1985a, b), then the anteriormost complete abdominal segment is the third on the venter and the second on the dorsum, and the anal lobes are on segment nine (as in Gullan 1984a). This contrasts with the condition now recognised for eriococcids, in which the anteriormost complete

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abdominal segment is the second ventrally and the first dorsally, and the anal lobes are on the eighth segment (Williams 1985b). This apparent contradiction is reconciled if the position of the vulva in *Apiomorpha* is considered to be labile. If the numbering system of Williams (1985b) is employed, the vulva in most *Apiomorpha* species lies between abdominal segments six and seven, but in some (e.g. *A. duplex* (Schrader): Figure 4, Gullan 1984a) it lies near the anterior margin of segment seven and in *A. karschi* Rubsaamen (Figure 22, Gullan 1984a) it is found on the anterior margin of segment six. Displacement of the vulva anteriorly in *Apiomorpha* may have resulted from the female's use of the abdominal apex as a plug for the gall orifice (Gullan 1984b). In the present paper, the segments are numbered according to the system of Williams (1985b) with the anal lobes on segment eight.

Structural variation was recorded as the range. Each figure represents a generalised individual based on all of the specimens specified in the description. WAM denotes Western Australian Museum, Perth. ANIC denotes the Australian National Insect Collection, CSIRO, Canberra.

## Systematics

### *Apiomorpha pomaphora* sp. nov.

Figures 1-5

#### Holotype

WAM (89 3), adult ♀ slide-mounted, ex associated gall on stem of *Eucalyptus eudesmioides* F. Muell. *sensu lato*, c. 15 km ENE of Kalbarri, Kalbarri National Park, Western Australia, 22 August 1987, P.J. Gullan.

#### Paratypes

WAM (89 4-6), 3 adult ♀♀ slide-mounted and associated galls, same data as holotype; WAM (89 7), 1 adult ♀ slide-mounted, ex associated gall on stem of *Eucalyptus gittinsii* Brooker et Blaxell, Brand Highway, c. 30 km S of Encabba, Western Australia, 21 August 1987, C.A.M. Reid; WAM (89 8), 1 adult ♀ slide-mounted, ex associated gall on stem of *E. eudesmioides* F. Muell. *sensu lato*, off Eagle Hill Road, c. 10 km NW of Watheroo, Watheroo National Park, Western Australia, 23 August 1987, P.J. Gullan; ANIC, 2 adult ♀♀ slide-mounted and associated galls, same data as holotype.

#### Other material examined

Five slide-mounts of first instar nymphs (3 in WAM, 2 in ANIC), 2 adult ♀♀ and additional first instar nymphs in alcohol (ANIC), additional galls of ♀♀ and ♂♂ (WAM), same data as holotype; 2 slide-mounts of first instar nymphs and additional nymphs in alcohol, galls of ♂♂ (WAM), c. 30 km S of Encabba, Western Australia; 3 additional galls of ♀♀ (WAM), c. 10 km NW of Watheroo, Western Australia.

#### Diagnosis

The adult female of *A. pomaphora* can be distinguished from those of other *Apiomorpha* species by the following combination of characters: abdomen curvilinearly tapered to base of anal lobes; abdominal segment VIII (IX of Gullan (1984a)) longer ventrally than dorsally; apex of each anal lobe bifurcate (terminating in 2 spine-like processes) and with 2-3 spine-like setae but no hair-like setae on apical half of each lobe; spine-like setae ventrally on at least last 3 abdominal segments and

dorsally on abdominal segments I-VII or II-VII only; multilocular pores scattered over body but densely clustered only on abdominal segments III-V dorsally and III-VII ventrally.

The adult female of *A. pomaphora* can be distinguished readily from that of *A. malleacola* in possessing spine-like setae on the venter of the posterior abdominal segments but lacking spine-like setae almost entirely on the dorsum of the head and thorax, and lacking transverse bands of multilocular pores on the dorsum of abdominal segments I, II and VI and the venter of the anterior abdominal segments.

The mature gall of the adult female is ellipsoidal to ovoid and can be distinguished from the ovoid galls of some other *Apiomorpha* species by its truncate apex produced by the deflection or detachment of the pointed cap or operculum. The gall of the adult female *A. malleacola* is mostly ovoid with an acute to obtuse apex and lacks the distinctive operculum found apically on the gall of the female of *A. pomaphora*.

## Description

*Adult female* (based on 8 slide-mounted specimens, Figure 1)

*Body* 9.7-16.7 mm long, 5.0-9.4 mm wide. Abdomen curvilinearly tapered to base of anal lobes. *Integument* of mature specimens membranous except for anal lobes and posterior abdominal segments, especially medially. *Antennae* 160-230  $\mu\text{m}$  long, segmentation indistinct. Apex with 5 or 6 stout, long (20-40  $\mu\text{m}$ ) fleshy setae and 1 or 2 slender, shorter (15-20  $\mu\text{m}$ ) fleshy setae. Total of 4-6 hairlike setae, 15-90  $\mu\text{m}$  long, with 1-4 on segment I, total of 1-4 on remainder. *Labium* 170-200  $\mu\text{m}$  long, 210-230  $\mu\text{m}$  wide. *Legs* with many hair-like setae on coxa and anterior part of femur. Forelegs 750-1000  $\mu\text{m}$  long; tarsal claw distinct. Middle legs 1200-1460  $\mu\text{m}$  long; tarsal claw small but distinct. Hind legs 1350-1650  $\mu\text{m}$  long; pustules on coxa and medial side of femur; tarsal claw small but distinct. *Spiracles* of synlabiate type. Mesothoracic spiracles 250-400  $\mu\text{m}$  long, 160-250  $\mu\text{m}$  wide. Metathoracic spiracles 320-380  $\mu\text{m}$  long, 220-280  $\mu\text{m}$  wide. *Abdominal segment VIII* lightly to moderately sclerotised, longer ventrally than dorsally, greater than twice length of anal lobes, 850-980  $\mu\text{m}$  wide, with 3-9 spine-like setae ventrally. *Anal lobes* moderately sclerotised, 420-520  $\mu\text{m}$  long, slightly divergent apically, tapering until near apex. Each apex terminating in 2 subequal spine-like processes, 20-35  $\mu\text{m}$  long; apical half of each lobe with 2-3 (usually 2: 1 on lateral, 1 on medial margin) spine-like setae, 30-50  $\mu\text{m}$  long. Hair-like setae, 220-400  $\mu\text{m}$  long, mostly confined to ventral outer surface of lobes. *Anal ring* 150-180  $\mu\text{m}$  in diameter, concealed within ventral invagination 160-200  $\mu\text{m}$  in diameter, with 30-40 ring setae, 300-400  $\mu\text{m}$  long.

*Venter* with spine-like setae, 50-130  $\mu\text{m}$  long, either singly or in a row extending from posterolateral margin on each side of abdominal segments V-VII and in an arc or inverted-V, interrupted medially, on VIII; total number per segment as follows: 0-2 (mostly 0, 50-70  $\mu\text{m}$  long) on V; 3-13 (50-110  $\mu\text{m}$  long) on VI; 15-27 (70-130  $\mu\text{m}$  long) on VII; 3-9 (80-120  $\mu\text{m}$  long) on VIII. Hair-like setae on all body segments, 30-600  $\mu\text{m}$  long, longest near spine-like setae on posterior abdominal segments. Multilocular disc pores absent from head, scattered on thorax, in lateral clusters on abdominal segments

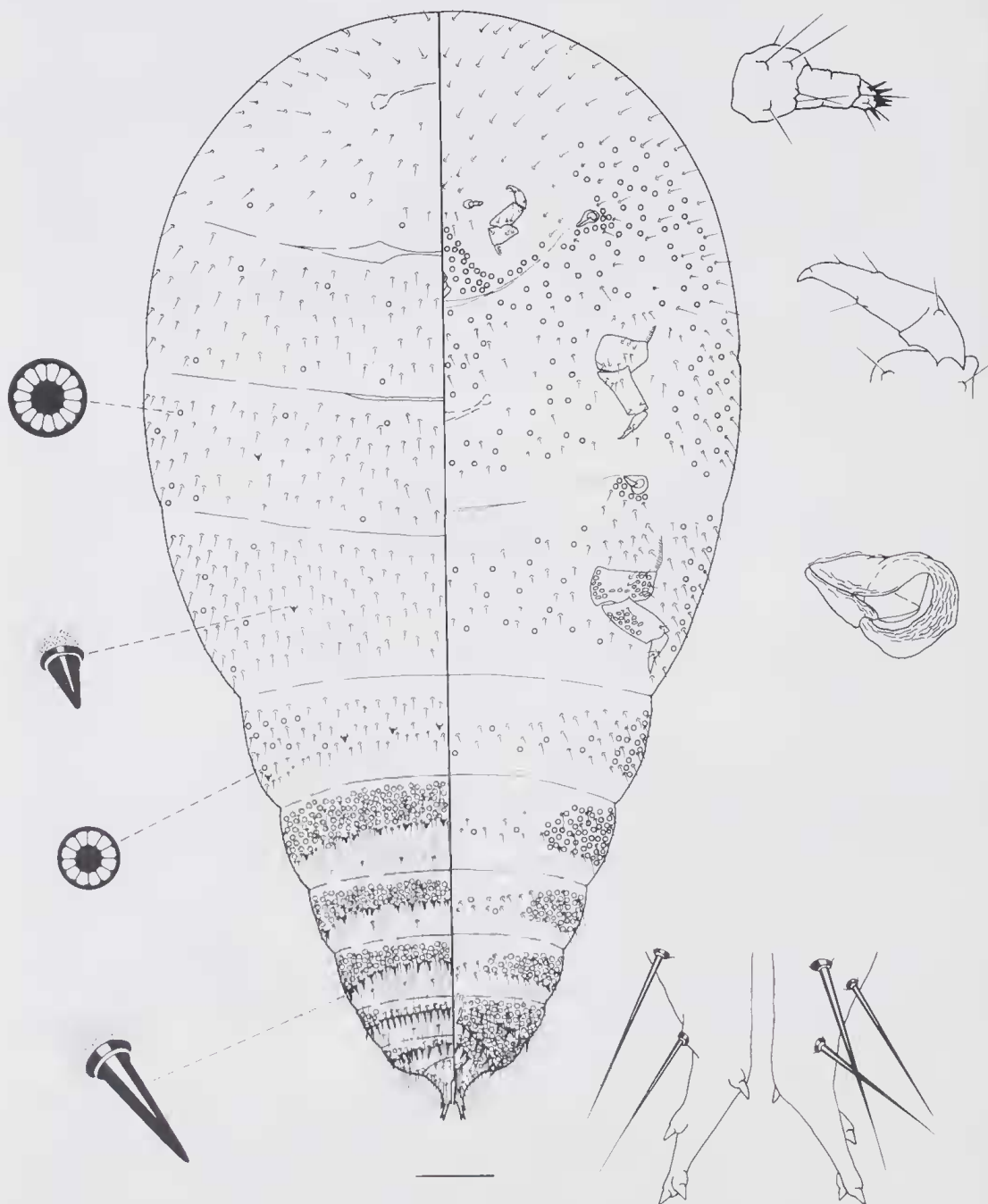


Figure 1 Adult female of *Apiomorpha pomaphora* sp. nov. Scale line, 1 mm.

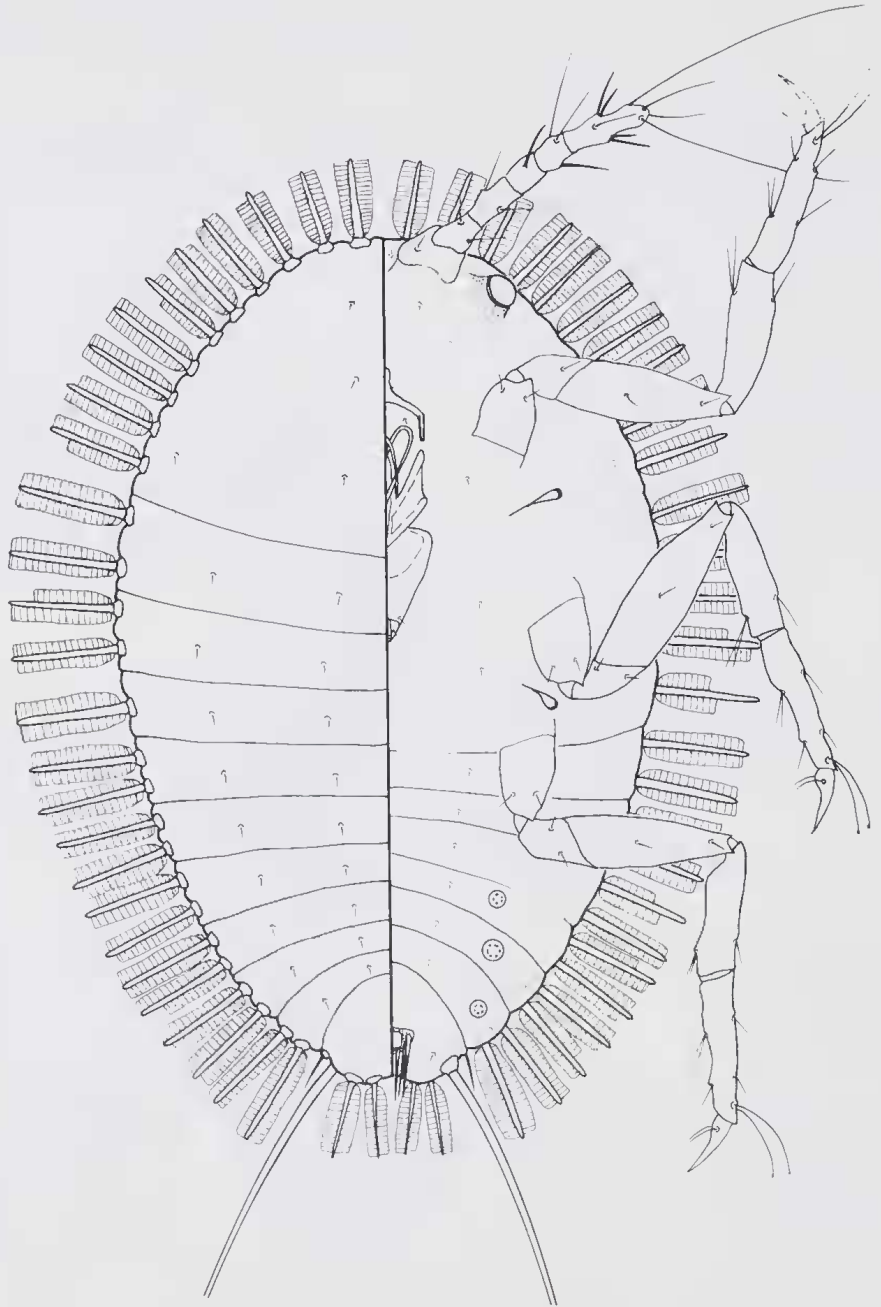
II-V, clusters denser on posterior segments with some pores sparsely scattered across each segment, densely clustered across VI-VII, and scattered anteriorly on VIII; pores of 8-17 locules present, 15-locular pores predominant on head and thorax, 11- and 13-locular predominant on abdomen.

*Dorsum* with spine-like setae, 30-160  $\mu\text{m}$  long, usually singly or in discontinuous row on thoracic segment III and abdominal segment I, in discontinuous row on abdominal segment II and in regular row on each of abdominal segments III-VII, absent from head, thoracic segments I and II and abdominal segment VIII; setae distributed as follows: 0-4 (30-40  $\mu\text{m}$  long) on thoracic segment III; and on abdominal segments: 0-6 (35-65  $\mu\text{m}$  long) on I; 3-13 (40-70  $\mu\text{m}$  long) on II; 8-18 (50-100  $\mu\text{m}$  long) on III; 15-27 (60-120  $\mu\text{m}$  long) on IV; 18-34 (50-140  $\mu\text{m}$  long) on V; 20-33 (70-160  $\mu\text{m}$  long) on VI; 13-26 (90-150  $\mu\text{m}$  long) on VII. Hair-like setae on all body segments, 60-700  $\mu\text{m}$  long, longest near spine-like setae on posterior abdominal segments. Multilocular disc pores absent from head, sparsely scattered near lateral and/or anterior and posterior margins of thoracic segments and abdominal segments I and II, in dense band on anterior half of abdominal segments III-V, near lateral margins of VI and VII, absent from VIII; pores of 10-17 locules present, 15-locular pores predominant on head and thorax, 13-locular pores predominant on abdomen.

*First instar nymph* (based on 8 slide-mounted specimens, Figure 2)

*Body* ellipsoidal, 360-430  $\mu\text{m}$  long (excluding antennae and anal lobe setae), 210-240  $\mu\text{m}$  wide. *Integument* membranous. *Antennae* distinctly 6-segmented, 145-160  $\mu\text{m}$ ; basal segment broadest, remainder cylindrical with apical segment longest, 43-50  $\mu\text{m}$ . Fleshy setae distributed on segments as follows: 1 on IV, 1 on V and 4 or 5 on VI, with 2 of latter shorter and more slender than others. Hair-like setae distributed on segments as follows: 1 or 2 on I-III and V, 0 on IV and 4 apically on VI, with 2 of latter very long (up to 140  $\mu\text{m}$ ). *Eyes* simple, prominent, 17-20  $\mu\text{m}$  in diameter, near margin on venter close to antennal bases. *Labium* conical, 68-75  $\mu\text{m}$  long, 3-segmented. *Legs* subequal in length; cuticle without pustules. Coxa, trochanter and femur each with 2, tibia with 3 hair-like setae. Tarsus with 4 or 5 hair-like setae and a pair of apically capitate digitules situated dorsally; tarsal claw acute, curved, with an enlarged base bearing 1 pair of apically acute, ventral digitules. *Spiracles* with mesothoracic and metathoracic pair similar, 21-25  $\mu\text{m}$  long, 8-10  $\mu\text{m}$  wide across atrium. *Anal lobes* poorly developed, each bearing a single long hair-like seta, 390-430  $\mu\text{m}$  long, 1 short ventral hair-like seta posterolateral to anal ring, 1 robust lateral hair-like seta on outer margin and 2 fringed spine-like setae (described below) on posterolateral margin. *Anal ring* ventral, subcircular, 21-25  $\mu\text{m}$  in diameter, cellular, bearing 3 pairs of robust setae, 30-34  $\mu\text{m}$  long, and several pore-like structures.

*Venter* with short hair-like setae, 1-3  $\mu\text{m}$  long, distributed as follows: 3 pairs on head; 3 pairs medially and usually 2 pairs laterally on thorax; 1 pair medially and 1 pair laterally on abdominal segments II-VII forming 2 longitudinal rows on each side of body; setae only on anal lobes of abdominal segment VIII. Multilocular disc pores 7-9



**Figure 2** First instar nymph of *Apimorpha pomaphora* sp. nov. Scale line, 0.05mm.

$\mu\text{m}$  in diameter, distributed mediolaterally 1 pore on each side of abdominal segments V-VI and sometimes on VII; pores of 9 or 11 locules, but mostly 11.

*Dorsum* entirely margined by a single row of 58 enlarged spine-like setae, each winged by a horizontal, hyaline membrane which is truncate apically and easily damaged; setal numbers and lengths as follows: 28 setae 32-52  $\mu\text{m}$  long on head and thoracic margins; 1 seta on each side of abdominal segment I; 2 on each side of each of abdominal segments II-VIII; 45-52  $\mu\text{m}$  long on margins of abdominal segments I-VI; anterior setae on margins of VII 38-48  $\mu\text{m}$  long and posterior setae on VII often longest on body at 45-56  $\mu\text{m}$ ; setae on margins of VIII only 40-44  $\mu\text{m}$  long. Short hair-like setae, 2-4  $\mu\text{m}$  long, distributed as follows: 1 pair on head; 1 medial and 1 lateral pair on each thoracic segment and on abdominal segments I-VII forming 2 longitudinal rows on each side of body; setae absent from abdominal segment VIII. Multilocular disc pores absent.

*Gall of female* (based on 13 mature galls, Figures 3, 4)

Mature gall ellipsoidal to ovoid, apically truncate with a smooth or jagged flange and a pointed cap or operculum, 2.3-4.0 mm high, that becomes deflected or detached at maturity. Length of gall from base to apical flange 16.0-29.7 mm, maximum width 8.7-13.3 mm, sessile on stem, usually seated in slight depression with basal attachment 3.0-5.4 mm in diameter. Truncate gall apex 5.3-7.6 mm in diameter; apical orifice circular, 0.5-0.9 mm in diameter, situated in centre of cup-like apical depression 1.8-5.0 mm deep, 2.0-5.4 mm in diameter at rim. Gall cavity ovate, approximating contour of outer gall surface; wall 2.6-3.2 mm thick. Living gall usually uniformly light green, occasional specimen greyish brown.

*Gall of male* (based on 19 mature galls and 7 immature galls, Figure 5)

Mature gall tubular with slightly to distinctly dilated apex, 5.5-9.0 mm long, median diameter 1.2-1.7 mm, with basal attachment 0.8-1.1 in diameter, seated in small cup-like depression. Apex 1.5-3.6 mm in diameter, sometimes with undulating rim turned outward perpendicular to long axis of gall; cylindrical chamber, 0.7-1.0 mm in diameter, in body of gall. Living gall uniformly light green; greyish green to brown and wrinkled longitudinally when dry. Galls usually projecting at 60-90° to leaf surface.

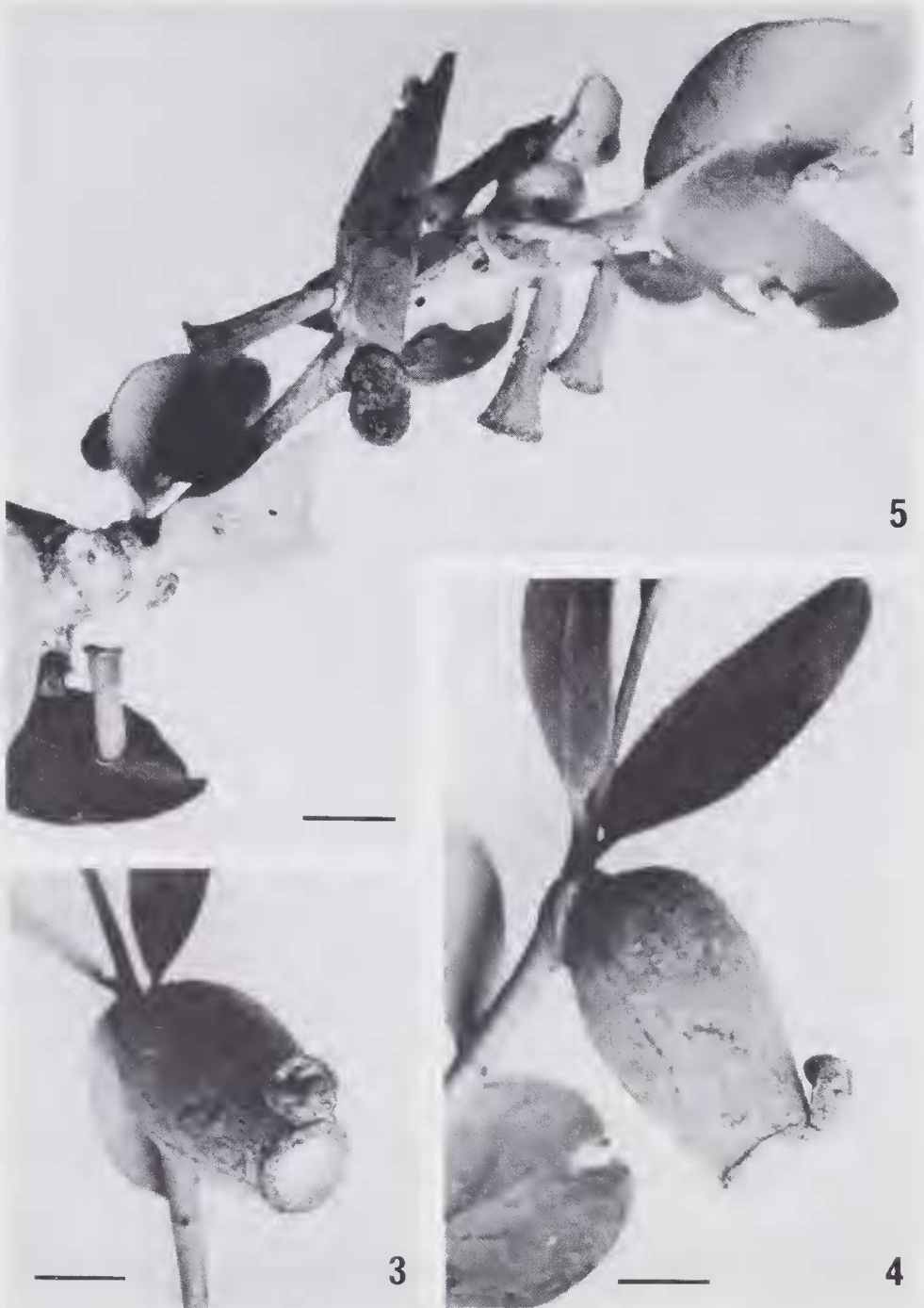
Immature gall tubular; apex not dilated, turned inward to conceal orifice.

### Etymology

“Pomaphora” is derived from the Greek *poma* for lid or operculum and *-phor* meaning bear or carry.

### Host-plant associations

Galls of females occur on stems. Galls of males are found on either or both leaf surfaces and frequently near the midrib. The two species of mallee eucalypt recorded as host plants belong to the subgenus *Eudesmia*, are closely related (Pryor and Johnson 1971; Brooker and Blaxell 1978) and intermediate forms exist (M.I.H. Brooker pers. comm.).



Figures 3-5 Mature galls of *Apiomorpha pomaphora* sp. nov., ex *Eucalyptus eudesmioides*, c. 15 km ENE of Kalbarri, Kalbarri National Park, Western Australia. 3,4: galls of adult females; 5: galls of adult males. Scale lines, 0.5 cm.



### Acknowledgements

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